PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Means for Installing Split Resilient Retaining Rings

We, MORRIS MOTORS LIMITED, a British Company, of Machining Branch, Wolseley Works, Ward End, Birmingham, 8, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with the installation of split resilient retaining rings (commonly known as "circlips") of the expanding type, namely those which have to be contracted in order to be inserted in a cylindrical bore formed with a peripheral groove into which the ring is sprung.

The normal method of fitting readily pliable circlips is to employ a special tool, resembling pliers, which is engageable with holes formed at the ends of the circlip. This method, however, is impracticable for stouter circlips which are too stiff to yield sufficiently under the maximum force that can conveniently be applied manually.

According to this invention the installation of a split spring retaining ring of the expanding type is effected by employing a device actuated by pressure-fluid to impel the ring along an enveloping coaxial surface of progressively decreasing diameter whereby it becomes contracted sufficiently to enter the bore of the component which is to receive it. In this way any size of circlip, irrespective of its stiffness, may be fitted with ease and rapidity.

The preferred device in accordance with the invention is a pneumatic tool comprising a hollow head open at one end and arranged to receive the ring, part of the internal surface of the head being of tapering form with a maximum diameter not less than that of the ring and a minimum diameter not exceeding the diameter of the bore of the component in which the ring is to be inserted, and a ram operable by compressed air to impel the ring from the larger to the smaller end of the tapering part and thence into the said bore.

The head of the tool has a cylindrical portion provided with a semi-circular peripheral slot through which the ring is inserted in front of the ram, this being carried by a rod secured to a piston contained in a barrel to which the compressed air is admitted under the control of a piston valve. The latter is accommodated in a relatively slidable hollow handle to which the compressed air is supplied, the handle having inlet and exhaust ports co-operating with the piston valve and being fitted with a return spring by which it is urged into a position at which the barrel is placed in communication with the exhaust port.

Retaining rings of different sizes may readily be dealt with by having a corresponding set of heads and rams, and making them detachable from the body of the tool.

Referring to the accompanying drawings:—

Figure 1 is a sectional side elevation of a pneumatic tool in accordance with the invention;

Figure 2 is a fragmentary enlarged view of a portion of the same tool illustrating its mode of use; and

Figure 3 is a perspective view of a split spring ring the installation of which is effected by means of the tool shown in Figure 1.

The tool shown in Figure 1 has a barrel 1 containing a piston 2 which has associated with it a cup 3 of leather or other packing material and is secured to one end of a rod 4 the other end of which

carries a disc-like ram 5 which is secured by a locking screw 5a against the end of the piston rod and is disposed within a cylindrical head 6. The latter is coaxial with the barrel 1 and has a portion 7 of reduced diameter which is fixed to the barrel and is formed with a bearing 8 for the rod 4. A compression spring 9, acting between the piston 2 and the abutment constituted by the closed end of the barrel normally retains the piston assembly and the ram 5 in the position illustrated. At its other end the barrel 1 is fitted with an extension 10 having a recess 11 which receives a projection 12 formed on a hollow handle 13.

The handle 13 is provided with a union 14 affording connection to a compressed air line 15, and is formed with an inlet port 16 and an exhaust port 17. A piston valve 18 co-operates with these ports to control the admission of compressed air to the barrel 1. The piston valve 18 has a portion 19 of reduced diameter, located in a corresponding bore provided in the extension 10, and is formed with an axial duct 20 which can communicate with the ports 16 and 17 by way of a radial duct 21, depending upon the positions of these ports relatively to the duct 21. In the conditions represented in Figure 1, the duct 21 is in communication with the exhaust port 17, but when the head 6 of the tool is presented endwise to a rigid abutment, the handle 13 can be pushed axially against the resistance offered by a return spring 22. Thereupon the projection 12 on the handle enters further into the recess 11, with the result that the inlet port 16 is brought into communication with the radial duct 21 and the compressed air passes through the duct 20 and a hole 23 into the barrel 1. Consequently the piston 2 is forced along the barrel against the action of the spring 9, and the ram 5 is displaced correspondingly. Upon releasing the manual pressure exerted axially on the handle 13, the latter reverts to the position shown in Figure 1 under the influence of the return spring 22 and, in consequence, the piston valve 18 shuts off the supply of compressed air The spring 9 thereupon returns the piston 2 into the position shown in Figure 1, the air displaced by the return movement of the piston being expelled through the ducts 20 and 21 to the exhaust port 17. A peg 24, fixed to the handle 13, is slidable in a slot 25 formed in the extension 10, and in this way the handle is guided during its sliding movement and is prevented from turning.

The head 6 of the tool is formed with a semi-circular slot 26 into which a split spring ring 27 of the expanding type (Figure 2) is inserted, the internal diameter of the head adjacent the slot being sufficiently large to receive the uncompressed ring. The latter, which is made of steel, has the form shown in Figure 3. In order to ensure that the ring does not become misplaced when it is inserted in the slot 26, the face of the ram 5 is magnetised so that the ring adheres to it. The open end of the head 6 is made of reduced diameter to form an annular abutment face 28 which, as shown in Figure 2, is applied to the end face of the hollow component 29 the bore of which has a groove 30 in which the spring ring 27 is to be installed. After the ring 27 has been positioned, as indicated in Figure 2, the tool is presented to the component 29 and operated in the manner already described. The internal surface of the head 6 is formed with a tapering portion 31 as shown, the maximum diameter of this portion adjoining the slot 26 being not less than that of the ring 27, and the minimum diameter slightly less than the diameter of the bore of the component 29. Consequently the spring ring 27 is forcibly contracted when it is displaced axially along the enveloping convergent surface 31 by the pressure exerted by the ram 5. The contracted ring is then moved by the ram along a cylindrical portion 32 of the internal surface of the head 6, the diameter of the portion 32 being the same as that of the neighbouring end of the tapering portion 31. The open end of the portion 32 is bevelled internally at 33 in order to facilitate ejection of the ring into the position indicated at 34. The tool is then withdrawn, and the ring 27 is pushed into the groove 30 by the bearing (not shown) which it is to retain. A second ring is next inserted in the slot 26, and the extreme end of the head 6 is placed against the bearing which now lies between the first ring 27 and a groove 35. Upon operating the tool, the second ring becomes installed in the groove 35 because the air pressure forces the end of the head 6 away from the bearing when that ring makes contact with the face of the bearing.

What we claim is:—

1. The method of installing a split spring retaining ring of the expanding type, in which a device actuated by pressure-fluid is employed to impel the ring along an enveloping coaxial surface of progressively decreasing diameter whereby it becomes contracted sufficiently to enter the bore of the component which is to receive it.

2. A pneumatic tool for installing a split spring retaining spring of the ex-

panding type, comprising a hollow head open at one end and arranged to receive the ring, part of the internal surface of the head being of tapering form with a maximum diameter not less than that of the ring and a minimum diameter not exceeding the diameter of the bore of the component in which the ring is to be inserted, and a ram operable by compressed air to impel the ring from the larger to the smaller end of the tapering part and thence into the said bore.

3. A pneumatic tool according to claim 2, in which a cylindrical portion of the head is provided with a semi-circular peripheral slot through which the ring is inserted in front of the ram.

4. A pneumatic tool according to claim 2 or claim 3, in which the ram is carried by a rod secured to a piston contained in a barrel to which the compressed air is admitted under the control of a piston valve.

5. A pneumatic tool according to claim 4, in which the piston valve is accommodated in a relatively slidable hollow handle to which the compressed air is supplied, the handle having inlet and exhaust ports co-operating with the piston valve and being fitted with a return spring by which it is urged into a position at which the barrel is placed in communication with the exhaust port.

6. The method of installing a split spring retaining ring of the expanding type, substantially as described.

7. A pneumatic tool for installing a split spring retaining ring of the expanding type, constructed and arranged to operate substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

For the Applicants,
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Chartered Patent Agent.

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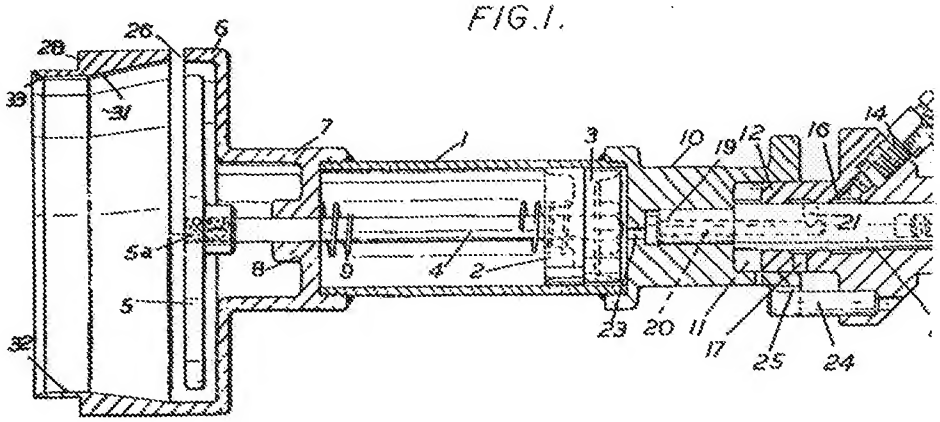
FIG. 1.



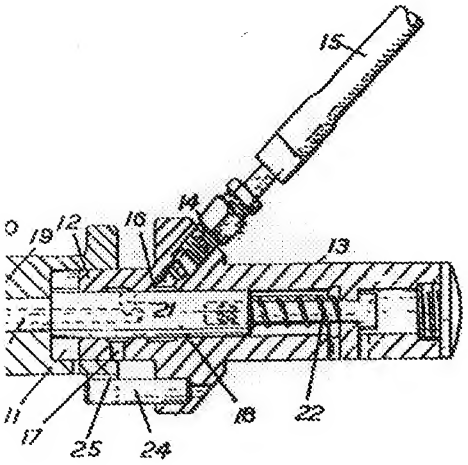


FIG. 2.

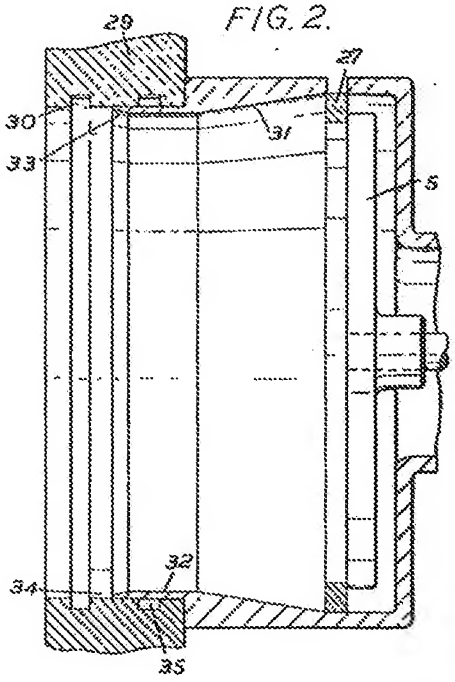


FIG. 3.

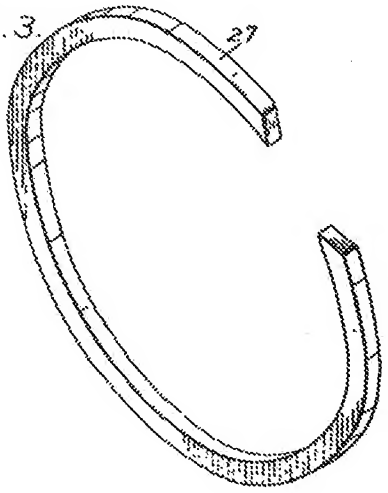


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FIG. 1.

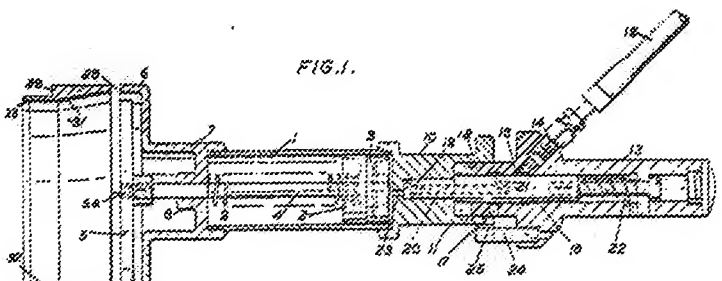


FIG. 2.

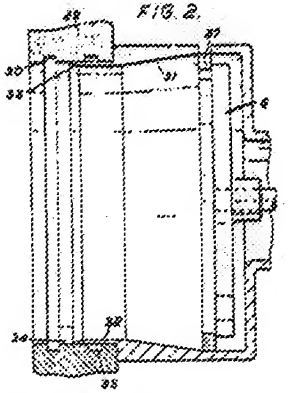
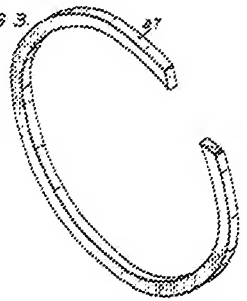


FIG 3.



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